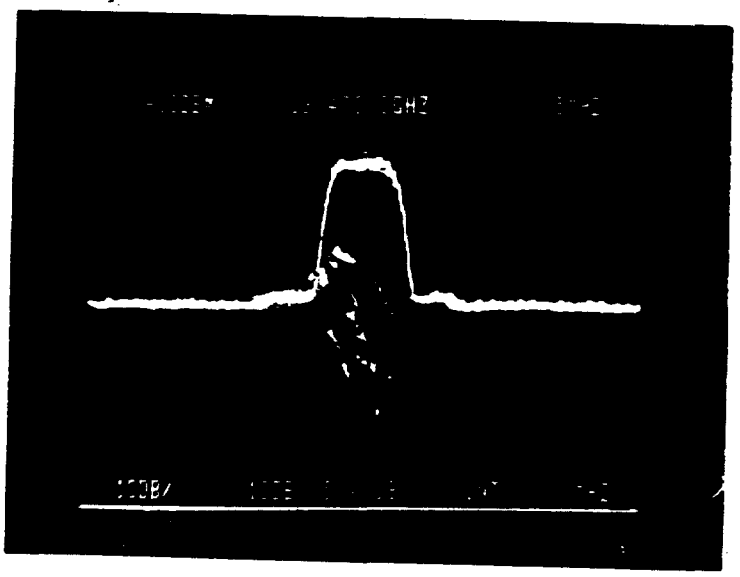
King Ranch, Texas

Reference Level dBm_i

Azimuth: 222°

Diversified Communications Engineering

-85



Site #2
Date: October 10, 1997
Time of Day: 1200
Antenna Centerline: 9 Ft.

Polarity: H
XMTR Power: 29 dBm
Level: -92 dBmi*
* Corrected for digital

Note: 12470 MHz was used for tests into DIRECTV Channel 242

12460 MHz was used for tests into ECHOSTAR Channel 220

(A)

Figure 3.1-1 RF Spectrum Analysis

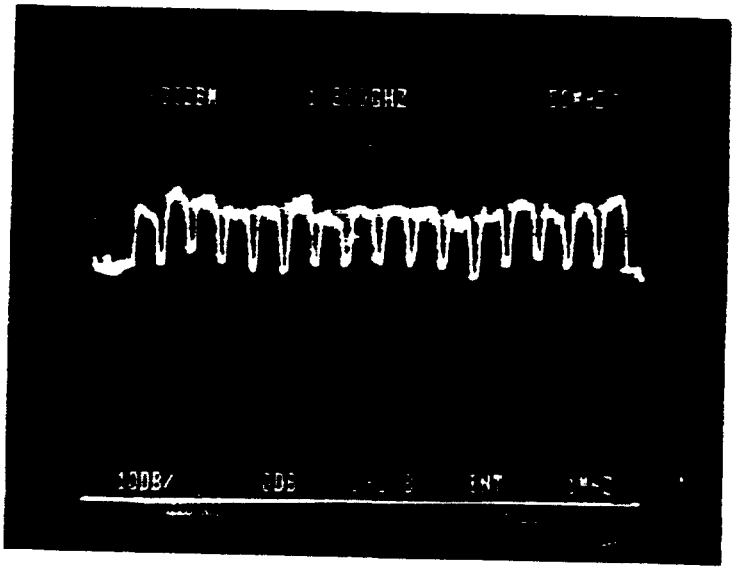
King Ranch, Texas

Reference Level dBm_1

Azimuth: 186°

Diversified Communications Engineering

-122



Site #2 DIRECTV
Date: October 10, 1997
Time of Day: 1208
Antenna Centerline: 9 Ft.

Elevation: 58 degrees

XMTR Power: 29 dBm

No interference to satellite reception

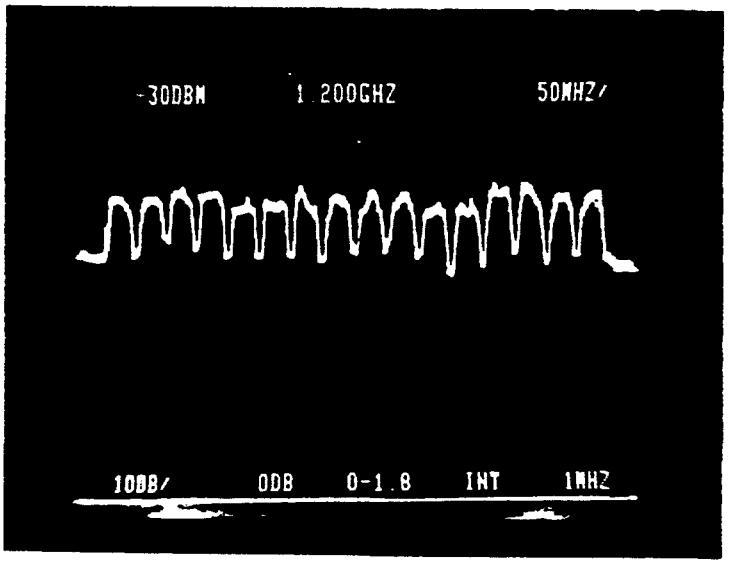
Heavy cloud cover w/ light rain

(A)

Reference Level dBm_1

Azimuth: 205°

-122



Site #2 ECHOSTAR
Date: October 10, 1997
Time of Day: 1200
Antenna Centerline: 9 Ft.

Elevation: 56 degrees

XMTR Power: 29 dBm

No interference to satellite reception

Heavy cloud cover w/ light rain

(B)

Figure 3.1-2 RF Spectrum Analysis

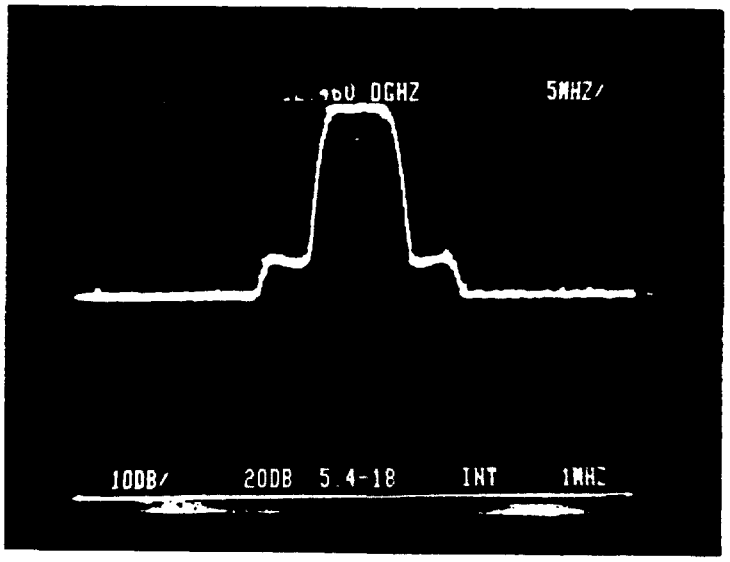
King Ranch, Texas

Reference Level dBm_1

Azimuth: 323°

Diversified Communications Engineering

-75



Site #3
Date: October 9, 1997
Time of Day: 1310
Antenna Centerline: 9 Ft.

Polarity: H
XMTR Power: 29 dBm
Level: -73 dBmi*
* Corrected for digital

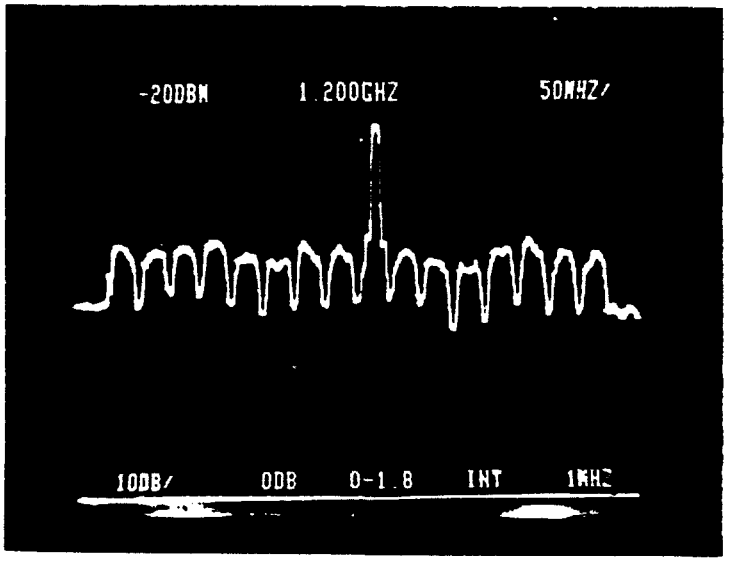
Note: 12470 MHz was used for tests into ECHOSTAR Channel 242

12460 MHz was used for tests into ECHOSTAR Channel 220

(A)

Reference Level dBm_1

-112



Site #3 ECHOSTAR

RFI Present

XMTR Power: 29 dBm

RFI Level: -114 dBm*
* Corrected for digital

(B)

Figure 3.1-3 RF Spectrum Analysis

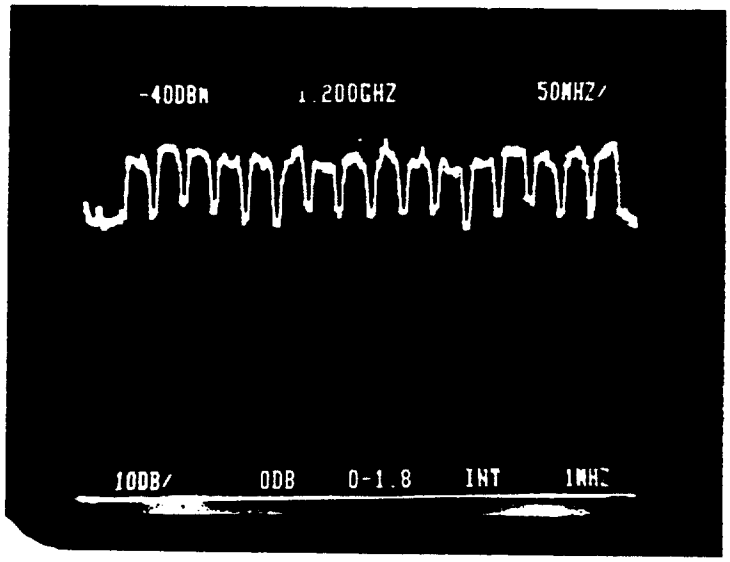
King Ranch, Texas

Reference Level dBm_1

Azimuth: 186°

Diversified Communications Engineering

-132



Site #3 DIRECTV
Date: October 9, 1997
Time of Day: 1650
Antenna Centerline: 9 Ft.

Elevation: 58 degrees

XMTR Power: 11 dBm

No interference to satellite reception

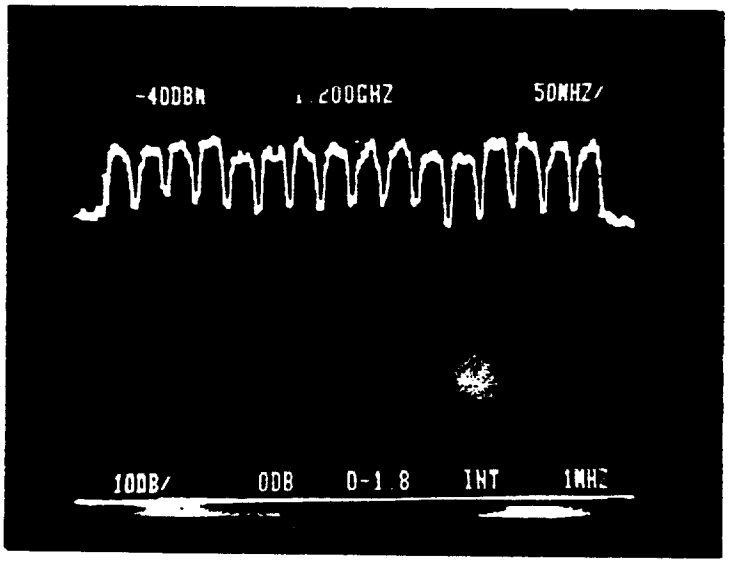
Heavy cloud cover w/ no rain

(A)

Reference Level dBm_1

Azimuth: 205°

-132



Site #3 ECHOSTAR
Date: October 9, 1997
Time of Day: 1645
Antenna Centerline: 9 Ft.

Elevation: 56 degrees

XMTR Power: 9 dBm

No interference to satellite reception

Heavy cloud cover w/ no rain

(B)

Figure 3.1-4 RF Spectrum Analysis

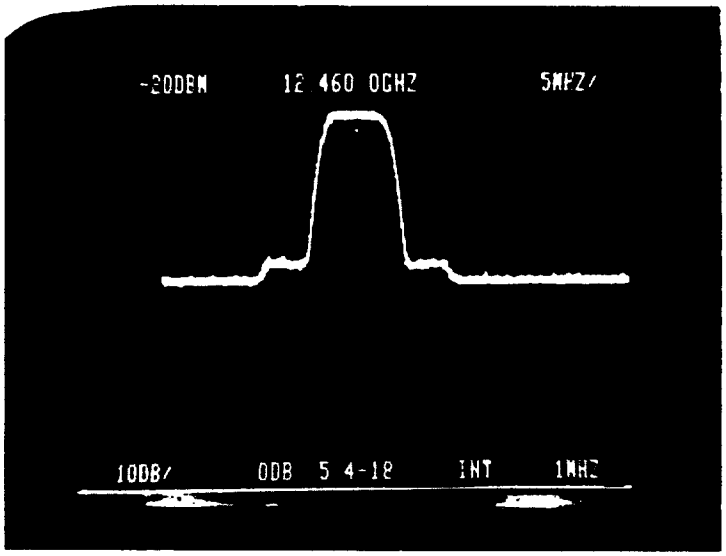
King Ranch, Texas

Reference Level dBm_i

Azimuth: 323°

Diversified Communications Engineering

-95



Site #4
Date: October 9, 1997
Time of Day: 1310
Antenna Centerline: 20 Ft.

Polarity: H
XMTR Power: 29 dBm
Level: -96 dBmi*
* Corrected for digital

Note: 12470 MHz was used for tests into DIRECTV Channel 242

12460 MHz was used for tests into ECHOSTAR Channel 220

(A)

Figure 3.1-5 RF Spectrum Analysis

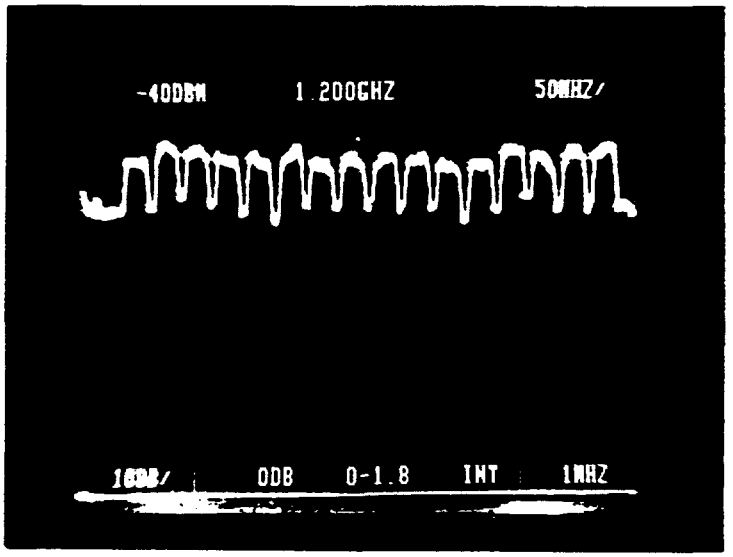
King Ranch, Texas

Reference Level dBm_1

Azimuth: 186°

Diversified Communications Engineering

-132



Site #4 DIRECTV
Date: October 9, 1997
Time of Day: 1320
Antenna Centerline: 20 Ft.

Elevation: 58 degrees

XMTR Power: 29 dBm

No interference to satellite reception

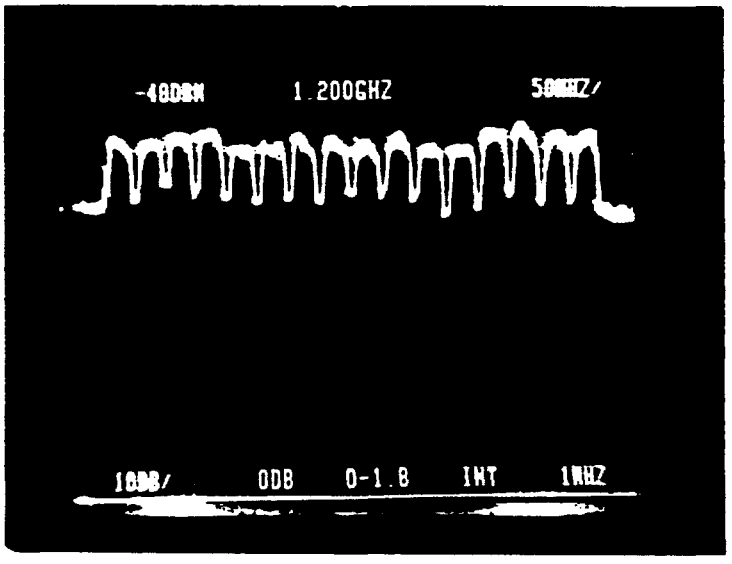
Heavy cloud cover w/ very light rain

(A)

Reference Level dBm_1

Azimuth: 205°

-132



Site #4 ECHOSTAR
Date: October 9, 1997
Time of Day: 1325
Antenna Centerline: 20 Ft.

Elevation: 56 degrees

XMTR Power: 29 dBm

No interference to satellite reception

Heavy cloud cover w/ very light rain

(B)

Figure 3.1-6 RF Spectrum Analysis

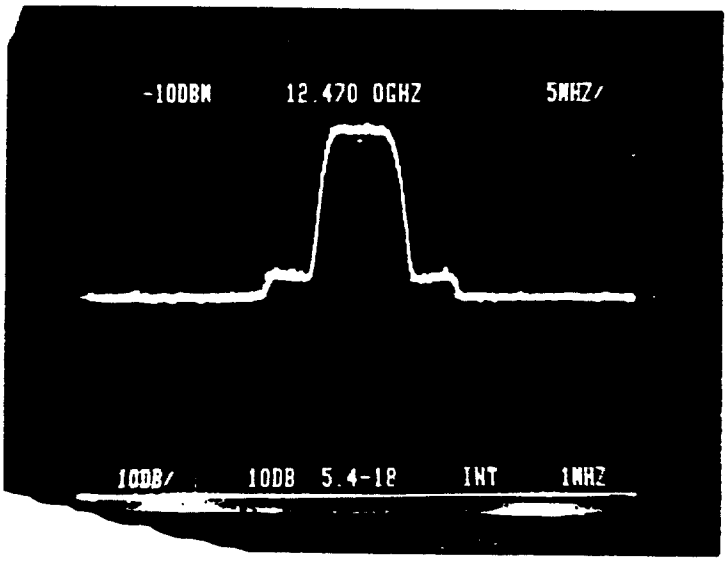
King Ranch, Texas

Reference Level dBm_I

Azimuth: 336°

Diversified Communications Engineering

-85



Site #5
Date: October 9, 1997
Time of Day: 1525
Antenna Centerline: 9 Ft

Polarity: H
XMTR Power: 29 dBm
Level: -87 dBmi*
* Corrected for digital

Note: 12470 MHz was used for tests into DIRECTV Channel 242

12460 MHz was used for tests into ECHOSTAR Channel 220

(A)

Figure 3.1-7 RF Spectrum Analysis

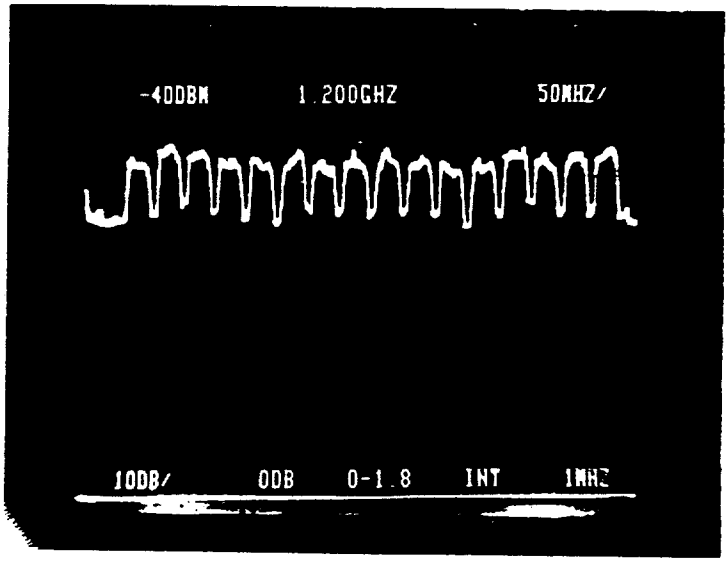
King Ranch, Texas

Reference Level dBm_1

Azimuth: 186°

Diversified Communications Engineering

-132



Site #5 DIRECTV
Date: October 9, 1997
Time of Day: 1528
Antenna Centerline: 9 Ft

Elevation: 58 degrees

XMTR Power: 20 dBm

No interference to satellite reception

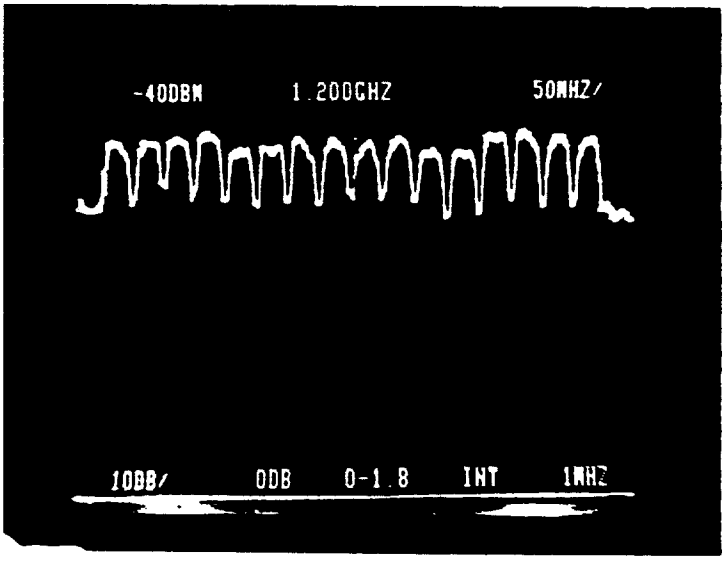
Moderate cloud cover w/ no rain

(A)

Reference Level dBm_1

Azimuth: 205°

-132



Site #5 ECHOSTAR
Date: October 9, 1997
Time of Day: 1540
Antenna Centerline: 9 Ft

Elevation: 56 degrees

XMTR Power: 29 dBm

No interference to satellite reception

Moderate cloud cover w/ no rain

(B)

Figure 3.1-8 RF Spectrum Analysis

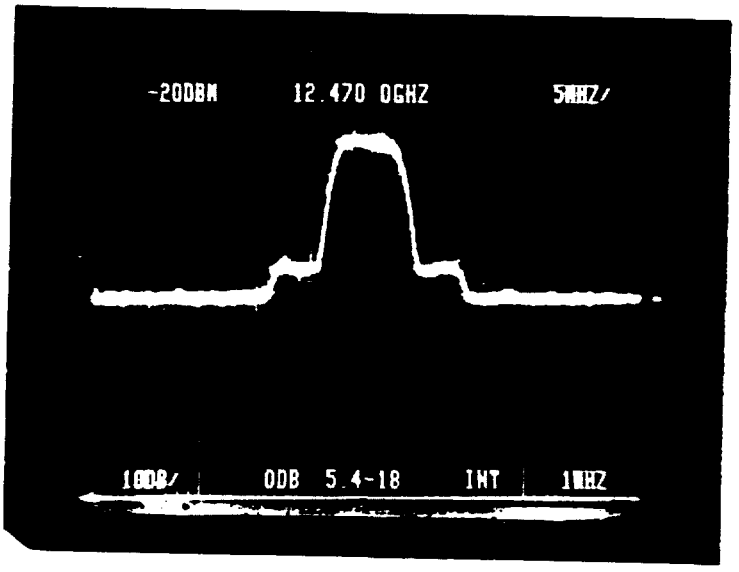
King Ranch, Texas

Reference Level dBm_i

Azimuth: 0°

Diversified Communications Engineering

-100



Site #6
Date: October 8, 1997
Time of Day: 1740
Antenna Centerline: 9 Ft.

Polarity: H

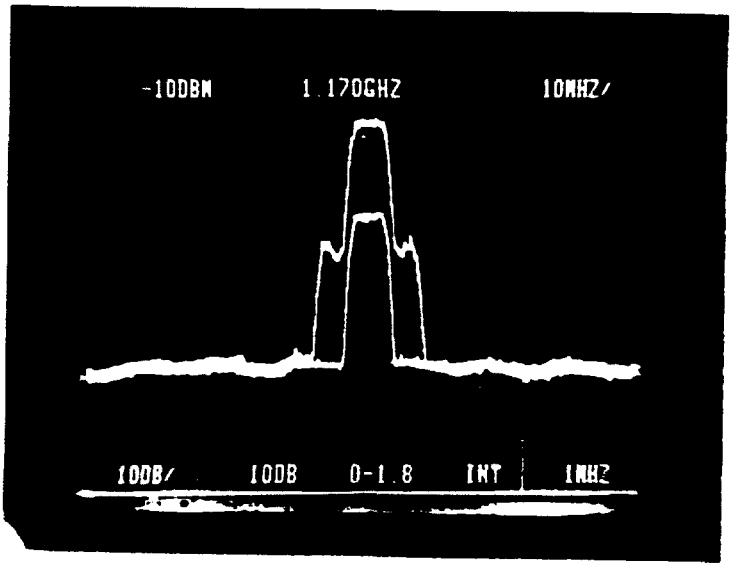
Level: -104 dBmi*
* Corrected for digital

(A)

Reference Level dBm_i

Azimuth: 0°

-102



Site #6
Date: October 8, 1997
Time of Day: 1750
Antenna Centerline: 9 Ft.

Polarity: H

Upper Trace
Level: -104 dBmi*
* Corrected for digital

Lower Trace
Level: -122 dBmi*
* Corrected for digital
XMTR down 18 dB
Video rcv excellent

(B)

Figure 3.1-9 RF Spectrum Analysis

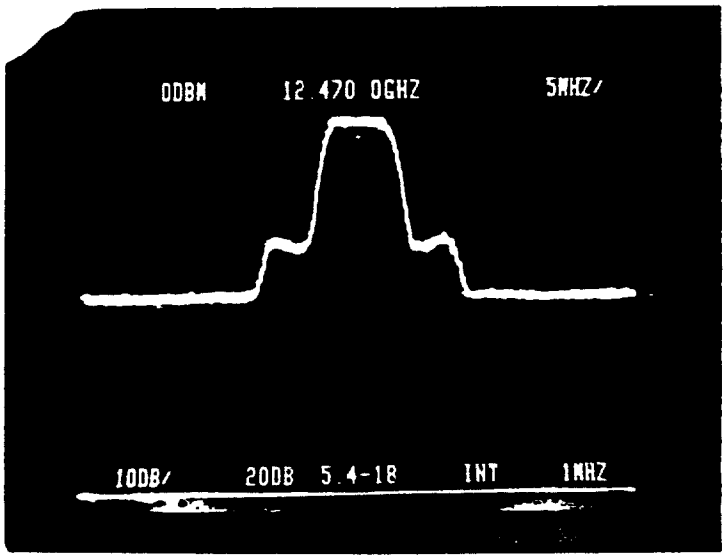
King Ranch, Texas

Reference Level dBm

Azimuth: 0°

Diversified Communications Engineering

-80



Site #7
Date: October 7, 1997
Time of Day: 1500
Antenna Centerline: 9 Ft.

Polarity: H
XMTR Power: 29 dBm
Level: -82 dBmi*
* Corrected for digital

Note: 12470 MHz was used for tests into DIRECTV Channel 242

12460 MHz was used for tests into ECHOSTAR Channel 220

(A)

Figure 3.1-10 RF Spectrum Analysis

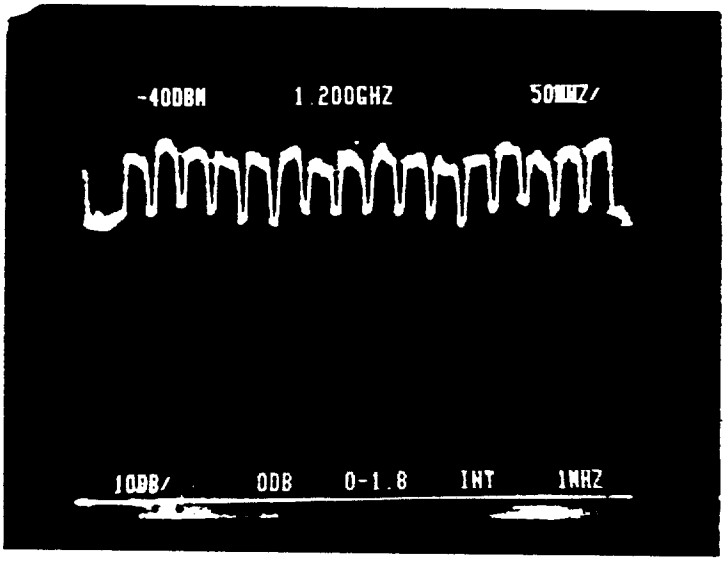
King Ranch, Texas

Reference Level dBm_1

Azimuth: 186°

Diversified Communications Engineering

-132



Site #7 DIRECTV
Date: October 7, 1997
Time of Day: 1537
Antenna Centerline: 9 Ft.

Elevation: 58 degrees

XMTR Power: 29 dBm

No interference to satellite reception

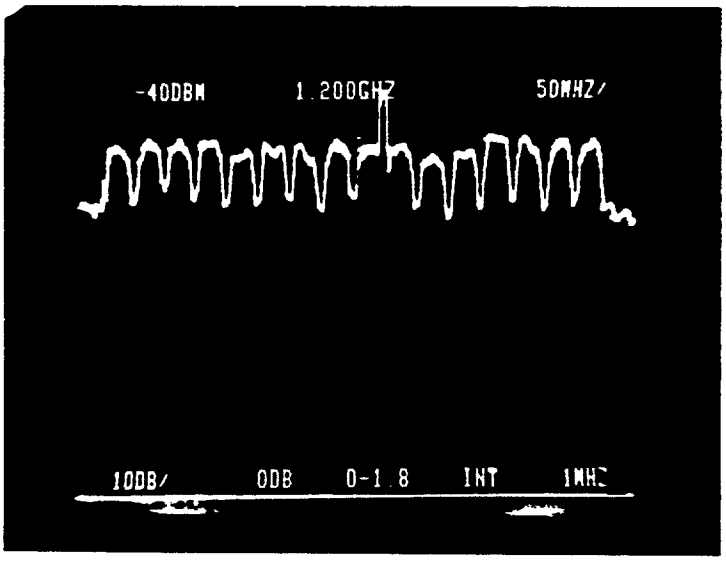
Light cloud cover w/ no rain

(A)

Reference Level dBm_1

Azimuth: 205°

-132



Site #7 ECHOSTAR
Date: October 7, 1997
Time of Day: 1645
Antenna Centerline: 9 Ft.

Elevation: 56 degrees

XMTR Power: 29 dBm
Interference to satellite reception
Light cloud cover w/ no rain

Note: This was the first group of tests. The test freq. for ECHOSTAR channel 220 was switched to 12460 MHz to move into the transponder. For this case interference to ECHOSTAR was eliminated at:
XMTR Power = 20 dBm

(B)

Figure 3.1-11 RF Spectrum Analysis

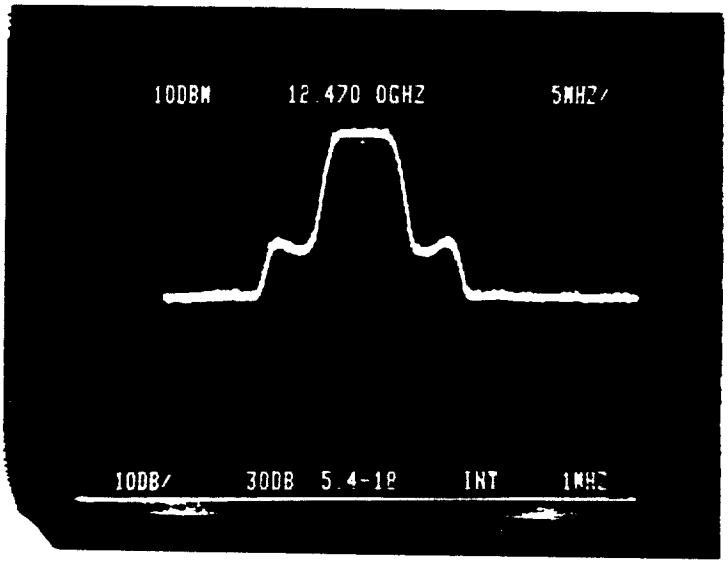
King Ranch, Texas

Reference Level dBm_1

Azimuth: 0°

Diversified Communications Engineering

-65



Site #8
Date: October 9, 1997
Time of Day: 1015
Antenna Centerline: 9 Ft.

Polarity: H
XMTR Power: 29 dBm
Level: -68 dBmi*
* Corrected for digital

Note: 12470 MHz was used for tests into DIRECTV Channel 242

12460 MHz was used for tests into ECHOSTAR Channel 220

(A)

Figure 3.1-12 RF Spectrum Analysis

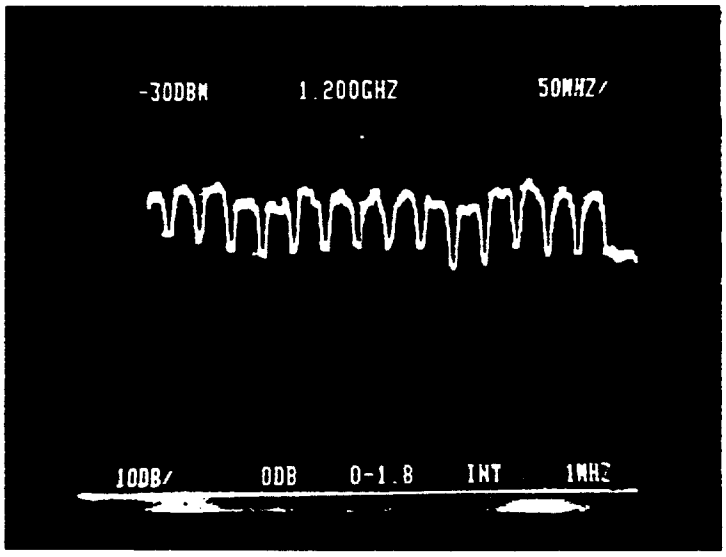
King Ranch, Texas

Reference Level dBm_1

Azimuth: 205°

Diversified Communications Engineering

-122



Site #8 ECHOSTAR
Date: October 9, 1997
Time of Day: 1030
Antenna Centerline: 9 Ft.

Elevation: 56 degrees

XMTR Power: 5 dBm

No interference to satellite reception

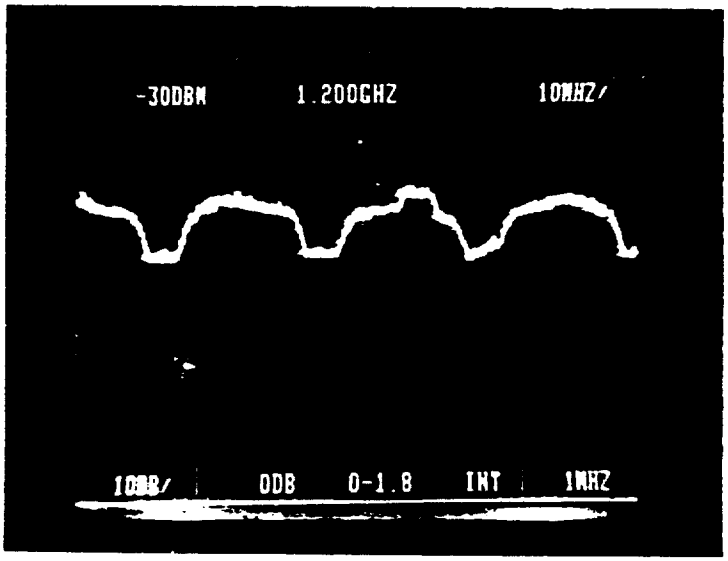
Light cloud cover w/ no rain

(A)

Reference Level dBm_1

Azimuth: 205°

-122



Site #8 ECHOSTAR
Date: October 9, 1997
Time of Day: 1036
Antenna Centerline: 9 Ft

Elevation: 56 degrees

XMTR Power: 7 dBm

Interference to satellite reception

Light cloud cover w/ no rain

(B)

Figure 3.1-13 RF Spectrum Analysis

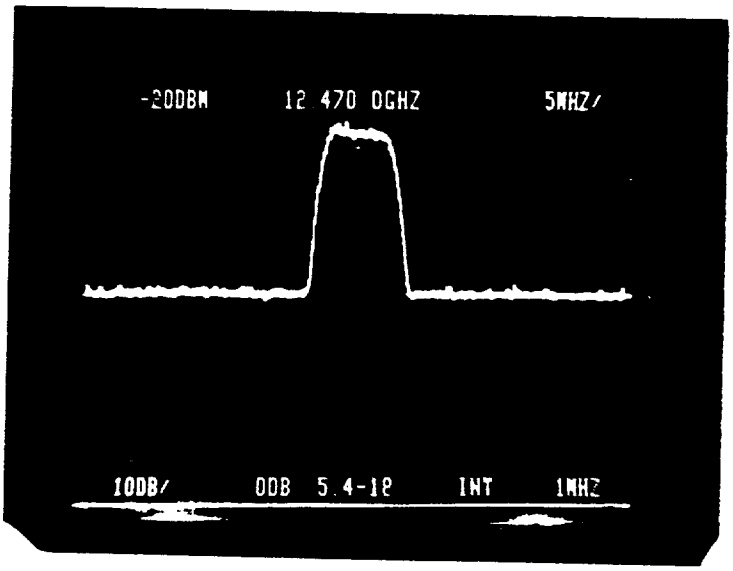
King Ranch, Texas

Reference Level dBm_1

Azimuth: 70°

Diversified Communications Engineering

-95



(A)

Site #9
Date: October 10, 1997
Time of Day: 1300
Antenna Centerline: 9 Ft

Polarity: H
XMTR Power: 9 dBm
Level: -96 dBmi*
* Corrected for digital

Note: 12470 MHz was used for tests into DIRECTV Channel 242

12460 MHz was used for tests into ECHOSTAR Channel 220

Figure 3.1-14 RF Spectrum Analysis

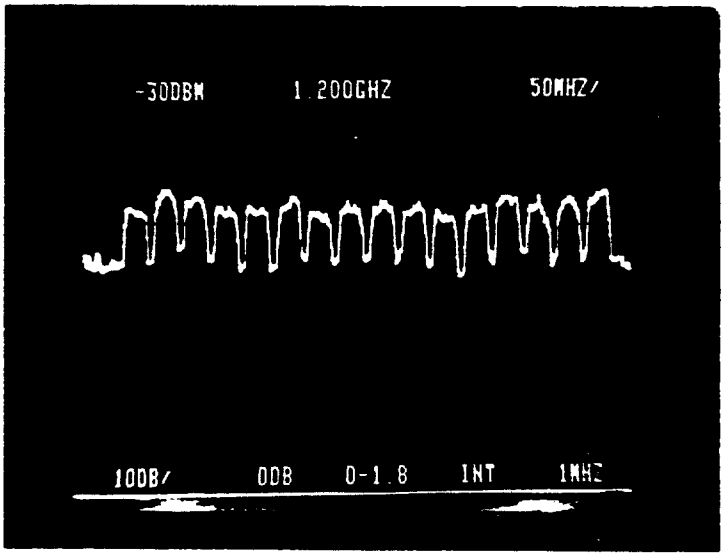
King Ranch, Texas

Reference Level dBm_1

Azimuth: 186°

Diversified Communications Engineering

-122



Site #9 DIRECTV
Date: October 10, 1997
Time of Day: 1338
Antenna Centerline: 9 Ft.

Elevation: 58 degrees

XMTR Power: 9 dBm

No interference to satellite reception

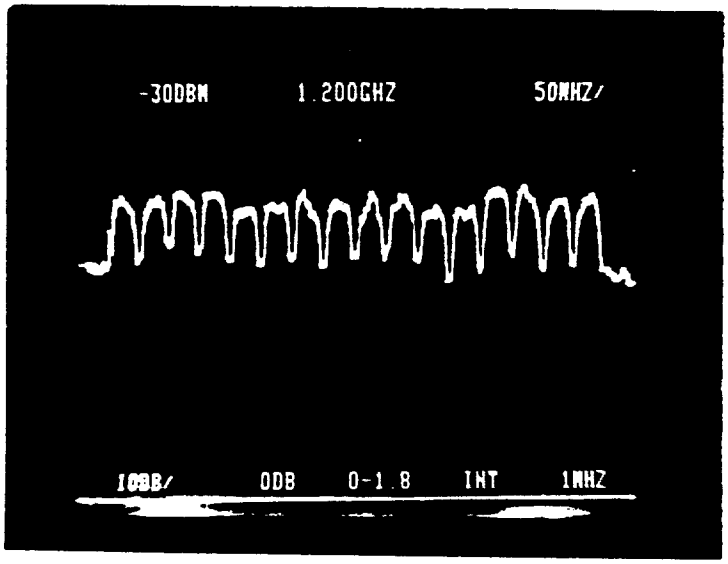
Heavy cloud cover w/ light rain

(A)

Reference Level dBm_1

Azimuth: 205°

-122



Site #9 ECHOSTAR
Date: October 10, 1997
Time of Day: 1345
Antenna Centerline: 9 Ft.

Elevation: 56 degrees

XMTR Power: 9 dBm

No interference to satellite reception

Heavy cloud cover w/ light rain

(B)

Figure 3.1-15 RF Spectrum Analysis

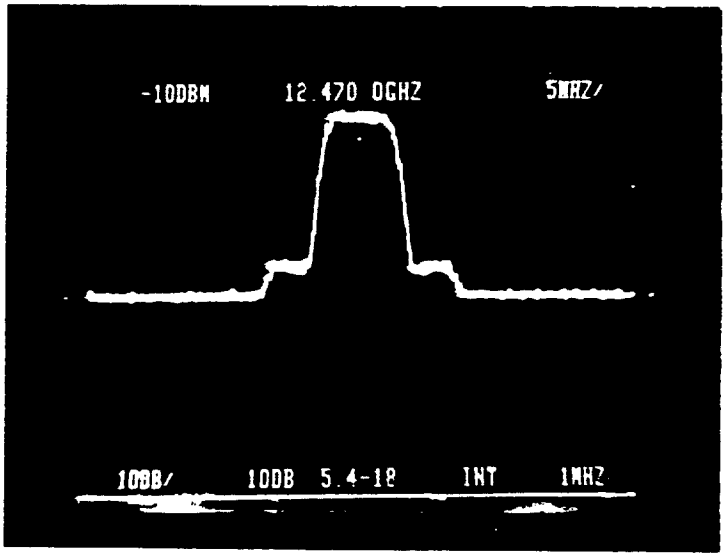
King Ranch, Texas

Reference Level dBm_i

Azimuth 132°

Diversified Communications Engineering

-85



Site #10
Date: October 10, 1997
Time of Day: 1300
Antenna Centerline: 9 Ft

Polarity: H
XMTR Power: 29 dBm
Level: -85 dBmi*
* Corrected for digital

Note: 12470 MHz was used for tests into DIRECTV Channel 242

12460 MHz was used for tests into ECHOSTAR Channel 220

(A)

Figure 3.1-16 RF Spectrum Analysis

King Ranch, Texas

Reference Level dBm_1

Azimuth: 186°

Diversified Communications Engineering

-132

Site #10 DIRECTV
Date: October 10, 1997
Time of Day: 1310
Antenna Centerline: 9 Ft.

Elevation: 58 degrees

XMTR Power: 29 dBm

No interference to satellite reception

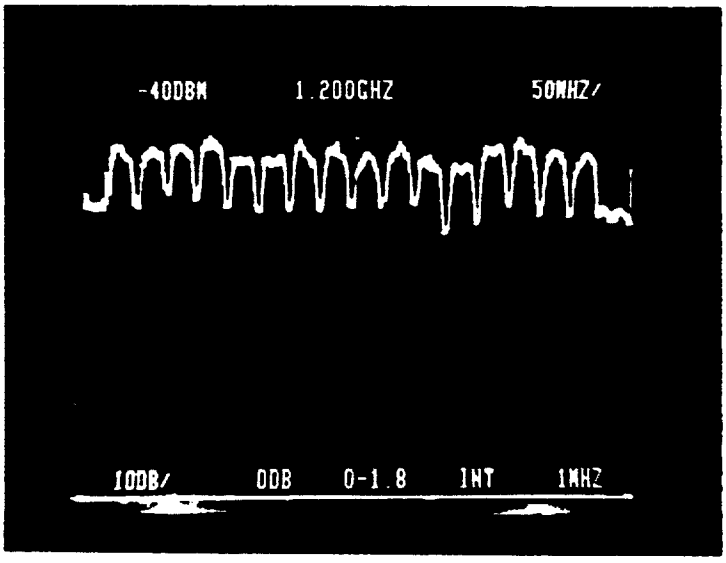
Heavy cloud cover w/ light rain

(A)

Reference Level dBm_1

Azimuth: 205°

-132



Site #10 ECHOSTAR
Date: October 10, 1997
Time of Day: 1315
Antenna Centerline: 9 Ft

Elevation: 56 degrees

XMTR Power: 29 dBm

No interference to satellite reception

Heavy cloud cover w/ light rain

(B)

Figure 3.1-17 RF Spectrum Analysis

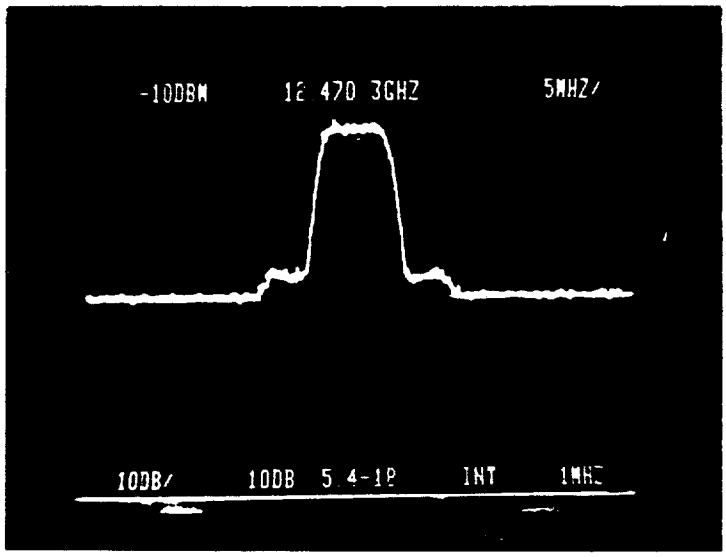
King Ranch, Texas

Reference Level dBm

Azimuth: 164°

Diversified Communications Engineering

-85



Site #11
Date: October 10, 1997
Time of Day: 1230
Antenna Centerline: 9 Ft

Polarity: H
XMTR Power: 29 dBm
Level: -87 dBmi*
* Corrected for digital

Note: 12470 MHz was used for tests into DIRECTV Channel 242

12460 MHz was used for tests into ECHOSTAR Channel 220

(A)

Figure 3.1-18 RF Spectrum Analysis

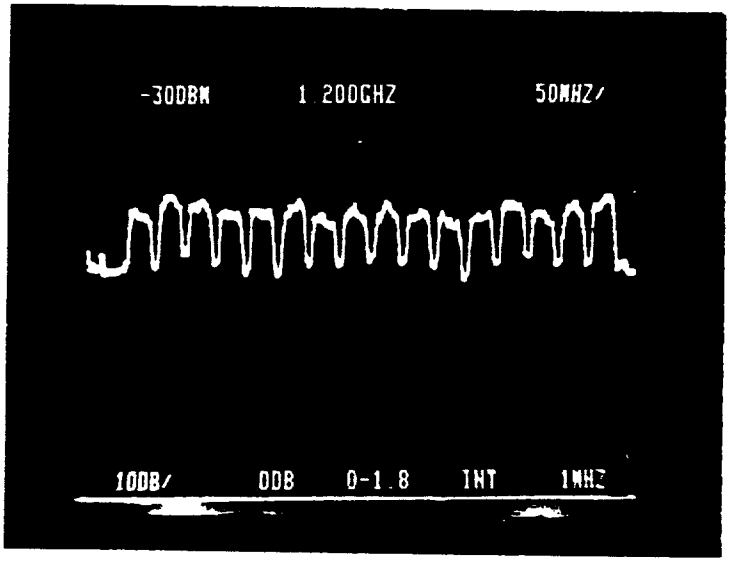
King Ranch, Texas

Reference Level dBm_1

Azimuth: 186°

Diversified Communications Engineering

-122



Site #11 DIRECTV
Date: October 10, 1997
Time of Day: 1234
Antenna Centerline: 9 Ft.

Elevation: 58 degrees

XMTR Power: 29 dBm

No interference to satellite reception

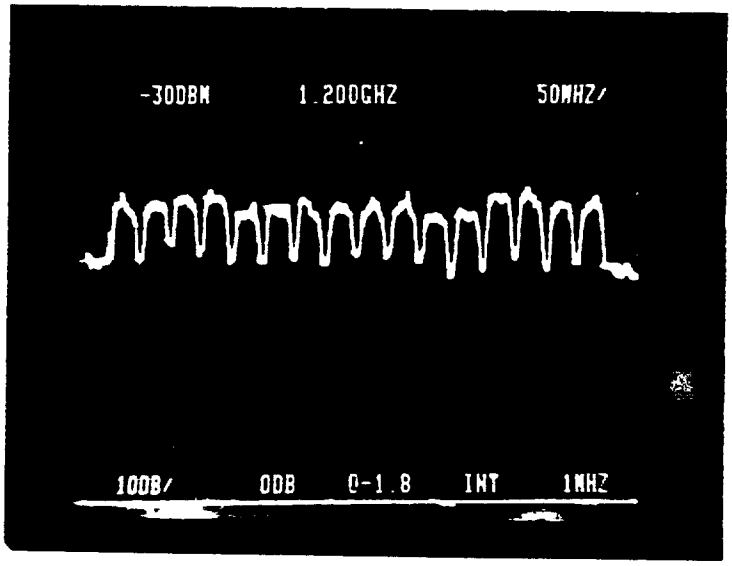
Heavy cloud cover w/ light rain

(A)

Reference Level dBm_1

Azimuth: 205°

-122



Site #11 ECHOSTAR
Date: October 10, 1997
Time of Day: 1238
Antenna Centerline: 9 Ft.

Elevation: 56 degrees

XMTR Power: 29 dBm

No interference to satellite reception

Heavy cloud cover w/ light rain

(B)

Figure 3.1-19 RF Spectrum Analysis

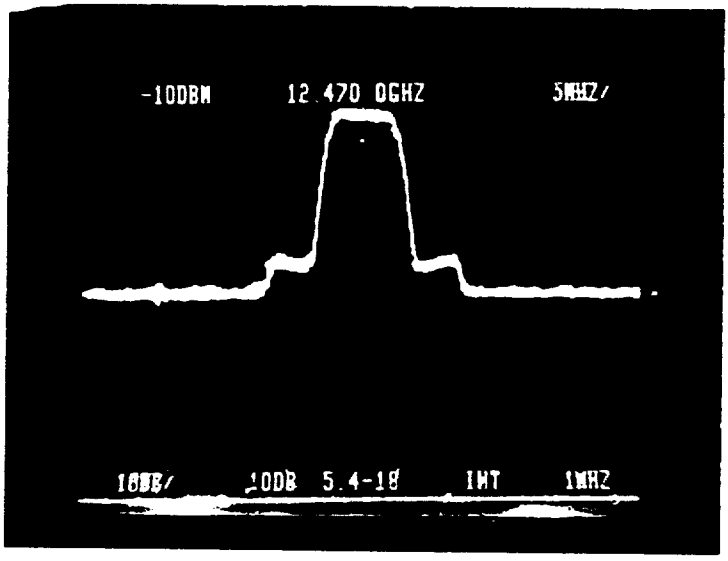
King Ranch, Texas

Reference Level dBm_I

Azimuth 180°

Diversified Communications Engineering

-85



(A)

Site #12
Date: October 10, 1997
Time of Day: 1100
Antenna Centerline: 9 Ft

Polarity: H
XMTR Power: 29 dBm
Level: -927 dBmi*
* Corrected for digital

Note: 12470 MHz was used for tests into DIRECTV Channel 242

12460 MHz was used for tests into ECHOSTAR Channel 220

Figure 3.1-20 RF Spectrum Analysis

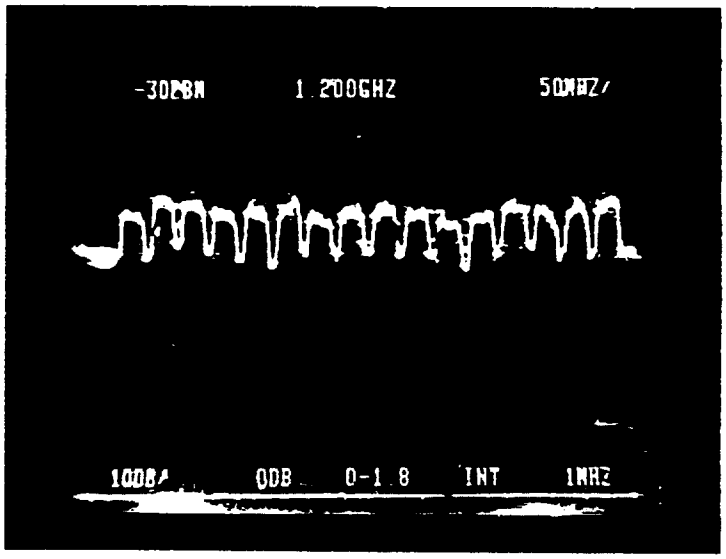
King Ranch, Texas

Reference Level dBm_1

Azimuth: 186°

Diversified Communications Engineering

-122



Site #12 DIRECTV
Date: October 10, 1997
Time of Day: 1112
Antenna Centerline: 9 Ft

Elevation: 58 degrees

XMTR Power: 29 dBm

No interference to satellite reception

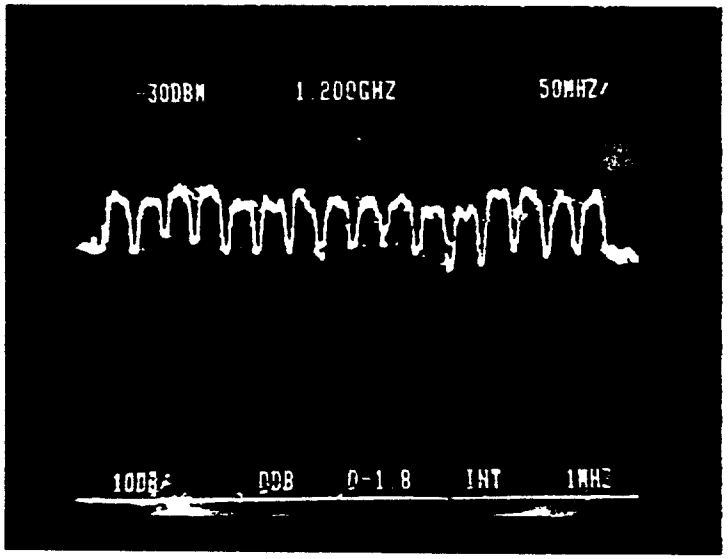
Heavy cloud cover w/ moderate rain

(A)

Reference Level dBm_1

Azimuth: 205°

-122



Site #12 ECHOSTAR
Date: October 10, 1997
Time of Day: 1110
Antenna Centerline: 9 Ft

Elevation: 56 degrees

XMTR Power: 29 dBm

No interference to satellite reception

Heavy cloud cover w/ moderate rain

(B)

Figure 3.1-21 RF Spectrum Analysis

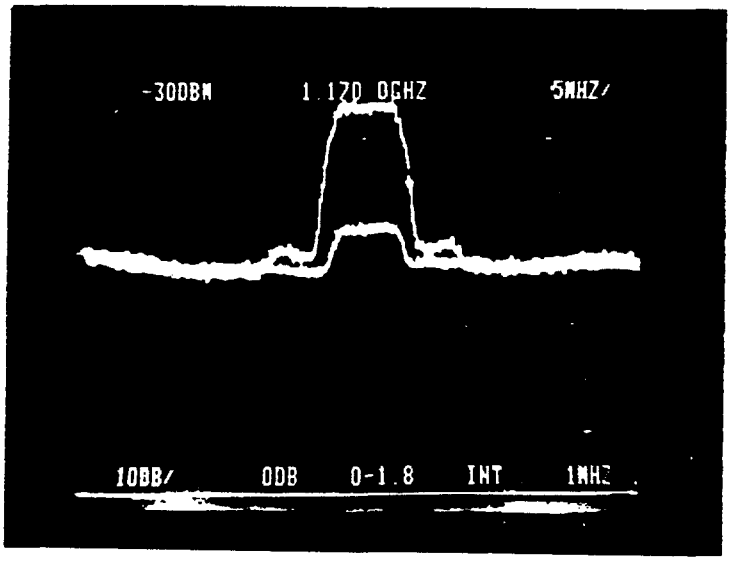
King Ranch, Texas

Reference Level dBm_1

Azimuth: 36°

Diversified Communications Engineering

-122



Site #13
Date: October 10, 1997
Time of Day: 1900
Antenna Centerline: 9 Ft

Polarity: H
XMTR Power: 29 dBm

Upper Trace
Level: -121 dBmi*
* Corrected for digital

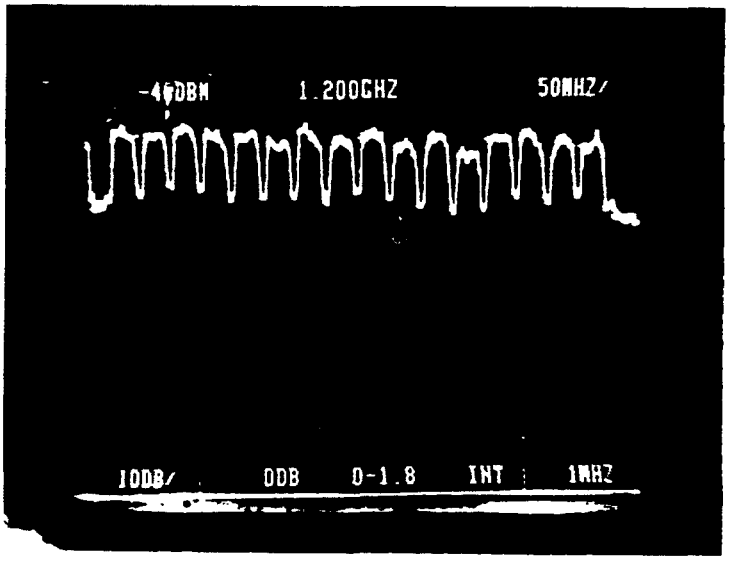
Lower Trace
Level: -144 dBmi*
*Corrected for digital
XMTR Level: 6 dBm
Video rcv excellent

(A)

Reference Level dBm_1

Azimuth: 186°

-132



Site #13
Date: October 10, 1997
Time of Day: 1915
Antenna Centerline: 9 Ft

Elevation: 58 degrees

DIRECTV

No interference

XMTR Level: 29 dBm

(B)

Figure 3.1-22 RF Spectrum Analysis

3.2 DBS Antenna Test #1 (Azimuth)

TRANSMITTER AT 52' AGL (GROUND ELEV: 85' AMSL)
XMTR OUTPUT POWER: 29 dBm WAVEGUIDE LOSSES: 2 dB
XMIT ANT GAIN: 10 dBi
DBS ANTENNA AT 9' AGL (GROUND ELEV: 80' AMSL)
DISTANCE BETWEEN ANTENNAS = 5280'
DBS ANTENNA AT 32 DEGREES ELEVATION
RECEIVE LEVEL AT DBS ANTENNA SITE = -89 dBmi (corrected for bandwidth)
AZIMUTH FROM TRANSMITTER TO DBS RECEIVER = 180 DEGREES

DBS antenna rotated through 360 degrees in 15 degree increments.

DBS Antenna Pointing Azimuth	Receive Level at DBS Antenna (dBmi)
0	-143
15	-146
30	-148
45	-144
60	-145
75	-149
90	-145
105	-147
120	-147
135	-135
150	-139
165	-140
180	-145
195	-141
210	-136
225	-131
240	-141
255	-144
270	-146
285	-146
300	-141
315	-141
330	-141
345	-146

The results are plotted in Figure 3.2-1 and the measurement data is presented in Figures 3.2-2 through 3.2-13.

	Azimuth	AMSL	Ant. Centerline
Transmitter Antenna	180 Degrees	85 feet	52 feet
DBS Antenna		80 feet	9 feet

Distance between antennas 5280 feet
Transmitter Level at DBS antenna = -89 dBmi

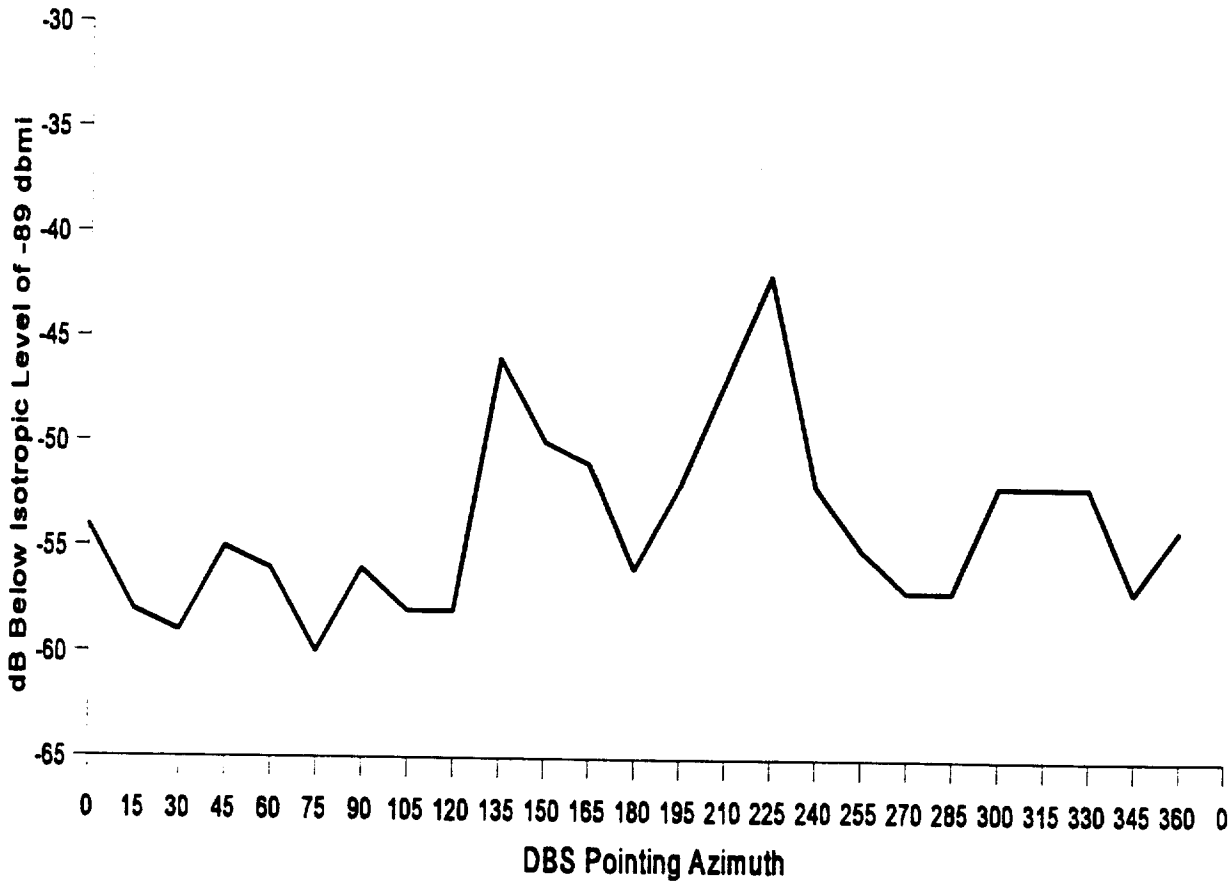


Figure 3.2-1

King Ranch, Texas

Reference Level dBm_I

Azimuth: 0°

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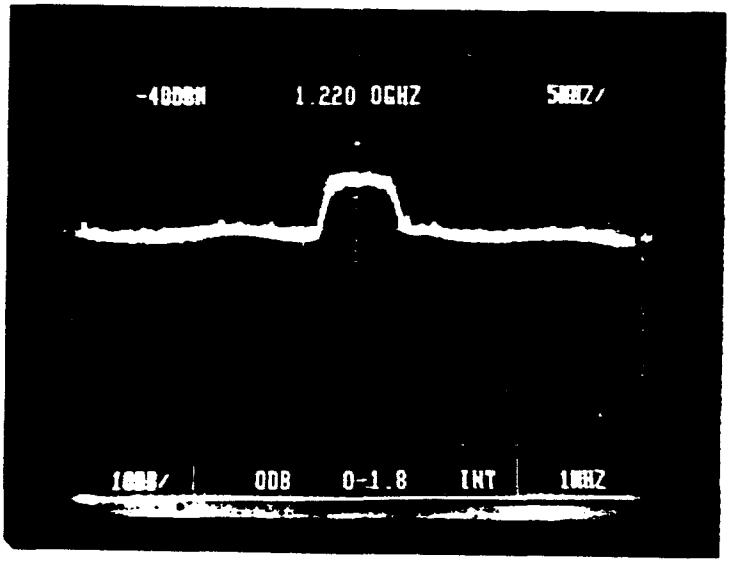
-123



Antenna Centerline: 9 Ft.

Elevation: 32 degrees

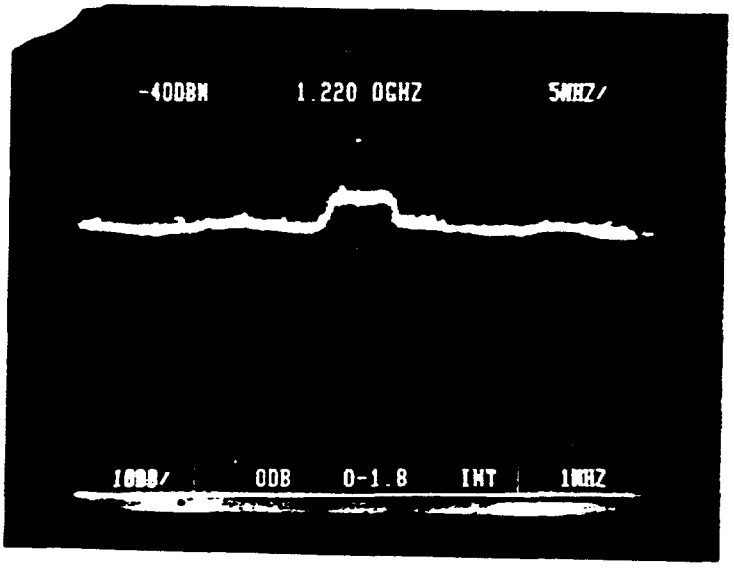
Level: -143 dBmi

(A)

Reference Level dBm_I

Azimuth: 15°

-123



Antenna Centerline: 9 Ft.

Elevation: 32 degrees

Level: -146 dBmi

(B)

Figure 3.2-2 RF Spectrum Analysis

King Ranch, Texas

Reference Level dBm_I

Azimuth: 30°

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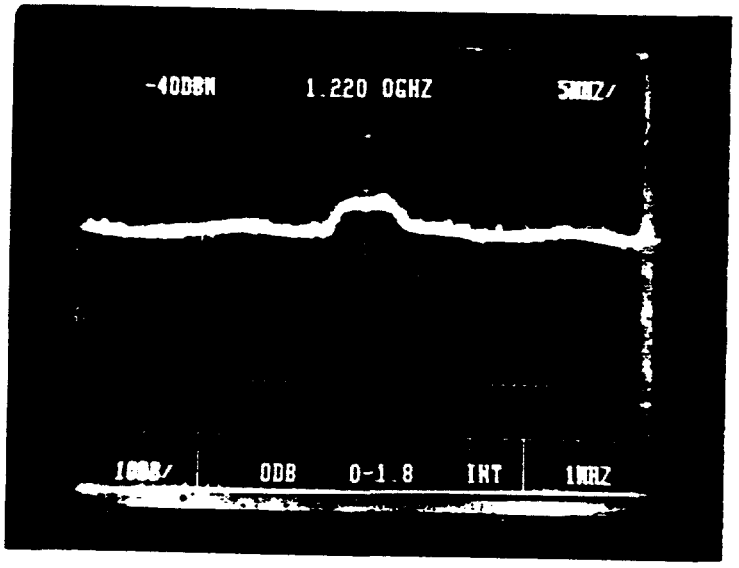
-123



Antenna Centerline: 9 Ft.

Elevation: 32 degrees

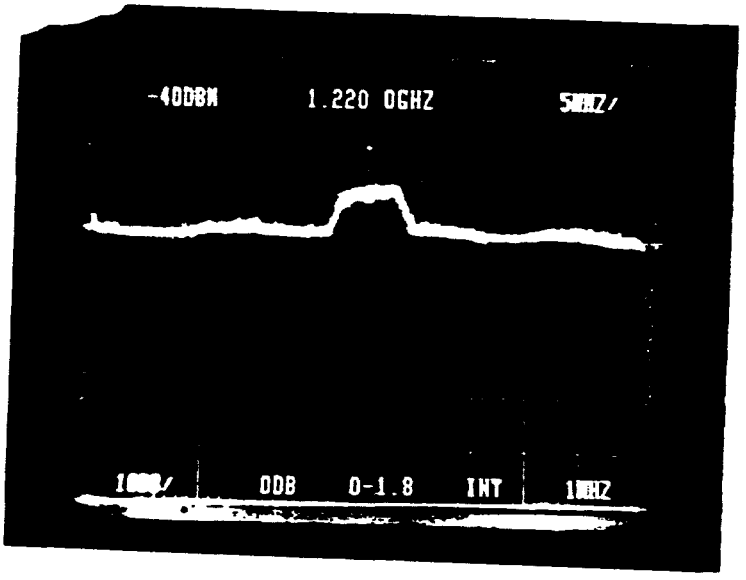
Level: -148 dBmi

(A)

Reference Level dBm_I

Azimuth: 45°

-123



Antenna Centerline: 9 Ft.

Elevation: 32 degrees

Level: -144 dBmi

(B)

Figure 3.2-3 RF Spectrum Analysis